WHY DO LOCAL GOVERNMENTS PRIVATIZE THE PROVISION OF WATER SERVICES? EMPIRICAL EVIDENCE FROM SPAIN

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RESUMEN: ¿Por qué unos gobiernos locales privatizan la gestión del servicio aguas mientras que otros optan por la gestión pública? La literatura no ha podido demostrar que la gestión privada sea más eficiente que la gestión pública. Por tanto, si la privatización no implica necesariamente mayores niveles de eficiencia, debe haber otros factores que influyan en la decisión de privatizar el servicio. Pero, ¿cuáles son esos factores? En este artículo presentamos los resultados de una investigación que analiza los factores determinantes de la privatización del servicio de aguas con datos de 741 municipios del Sur de España, para el período 1985-2006. Se emplea un modelo de elección discreta para analizar la influencia de cada factor sobre la probabilidad de privatizar. Entre los resultados obtenidos destacan la importancia de las economías de escala, la presión fiscal y el efecto proximidad.

ABSTRACT. Why do some local governments privatize water services, while others opt for public management? Economic literature has been unable to demonstrate that private management is more efficient than public management, so there must be other reasons that lead governments to privatize the service. But what are they? This paper presents the results of a study that analyzes the determinants of the privatization of water services with data from 741 municipalities located in the South of Spain over the period dating from 1985 to 2006. A discrete choice model is used to analyze the influence of each factor on the likelihood of privatization. Among our findings, it is worth highlighting the importance of economies of scale, the tax burden and the neighbouring effect.

Keywords: Water services; privatization; local governments.

JEL Classification: L33; H72; C25

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1. INTRODUCTION

Numerous economic activities have been extensively deregulated and privatized in developed economies over the last quarter of a century. Such changes in regulations have mainly been aimed at enhancing efficiency and productivity and, consequently, at achieving higher levels of social wellbeing. The activities that have received the most attention from both politicians and academics are mainly industries that enjoy the significant economies of scale associated to large firms, such as the financial sector, air transport and the basic telephone system. However, industries that have more fragmented markets in which firms are on average smaller and in some cases operate only on a local scale, have also been subject to deregulation. Among the latter, one peculiar case is the management of urban water services.

The privatization of public services, initially inspired by the public choice (Niskanen 1971) and property rights theories (Alchian and Demsetz 1973), was justified by the need to reduce production costs and enhance the efficiency of firms. Although empirical research in the 1970s tried to prove that the private management of urban water services was more efficient than public management, contradictory results were obtained (Mann and Mikesell 1976; Morgan 1977; Crain and Zardkoohi 1978; Bruggink 1982). Some thirty years after these first studies, recent reviews of the literature by Renzetti and Dupont (2003), Bel and Warner (2008) and González-Goméz and García-Rubio (2008) also conclude that private property cannot be systematically related to more efficient management in the case of water services. In fact, in most of the studies reviewed, the differences in terms of efficiency between public and private sector management were not significant.

The weak relationship between private property and efficient water management leads us to believe that the decision to privatize this service on behalf of many local governments in a large number of developed nations must be due to more complex reasons. Hence, the question we pose in this paper is: why do some local governments decide to transfer the running of urban water services to a private firm, while others opt for maintaining public management? In other words, if privatization does not necessarily imply greater efficiency, what factors lead local governments to privatize the management of water services?

Despite this industry attracting enormous attention from applied research in the field of economics, there are few references in the literature that have analyzed the factors that influence local governments' decisions to privatize urban water services. As far as we are aware, this issue has only been specifically addressed by Ménard and Saussier (2000). In addition to this, some references to privatizing or externalizing the urban water service can also be found in research applied to multiple sectors (Joassart-Marcelli and Musso 2005; Tavares and Camöes 2007; Bel and Fageda 2008). Finally, it is also worth quoting the research by Carpentier *et al.* (2006) and Martínez-Espiñeira *et al.* (2009) who, despite their primary objective being to analyze the causes of the differences in water prices, also study the determinants of the decision made by local governments in regard to the public or private management of water services.

In this framework, the contribution of our paper to this field of research is to provide empirical evidence concerning the factors determining the decision of privatizing water services on behalf of local governments. Our research is based on a sample of 741 municipalities in the Southern Spanish region of Andalusia, with data for the period 1985-2006.

Taking into account the nature of the variable to be explained, which indicates whether or not each municipality in the sample has privatized water services within the period analysed, we use a probit model to investigate the variables capable of affecting the probability of privatization. One feature of our paper that is worth highlighting is that, unlike most of the previous research, we take the value of explanatory variables at the time when water services are privatized, rather than later on, as most previous papers do. This aspect is particularly important for research in which the sample period is very long, as in this case. As pointed out by Bel and Fageda (2007), the value that the explanatory variables take at the time *t*, when data are observed could certainly be different to the value at *t-n*, in when the local government took the decision to privatize. This means that by considering the temporary nature of the variable, as we do in this research, we expect the model to have greater explanatory power and consistency.

The article is structured as follows. The next section presents a review of the causes that influence the decision made by local governments in reference to the running of public services, paying special attention to the case of privatizing water services.

The following section briefly outlines the data and the methodology and presents the main results. Finally, the last section includes a summary of the research and the conclusions drawn.

2. WHAT FACTORS INFLUENCE THE DECISION OF WHO MANAGES LOCAL SERVICES? A BRIEF REVIEW OF THE LITERATURE

This section reviews the literature concerning the factors that explain local government decisions regarding the institutional formula chosen to manage municipal services. In the first place, research applied to municipal services in general is reviewed, while in the second place we make a specific reference to the studies that include results referring to the privatization of urban water supply services.

2.1. Review for Municipal Services in General[1]

Since the seminal paper by Ferris (1986), there have been several attempts to analyze the factors that influence local government decisions to delegate the provision of municipal services. This would be the case of Ferris (1986) himself, and also Morgan *et al.* (1988), Benton and Menzel (1992), Miranda (1994) and Greene (1996). In these studies, mainly based on regression analyses, the variable being explained is the percentage of services delegated with respect to total municipal services.

In other cases, the factors explaining why a particular municipal service has been privatized are analyzed. Some examples include Bel and Miralles (2003), Dijkgraaf *et al.* (2003), Walls *et al.* (2005) and Tavares and Camöes (2007). Methodological approaches are also based, mostly, on regression techniques. Finally, Hirsch (1995) and Cruz (2007) evaluate the importance that local governments give to various municipal services, studying their preferences using local government budgets as a basis. The variable being explained in the foregoing studies is the percentage of expenditure channelled to various municipal services.

[1] Recent reviews of the literature carried out by Bel and Fageda (2007, 2009) provide details about the methodology, data and results of previous papers analyzing the decisions into contracting out by local governments.

As regards the reasons behind local government decisions to privatize municipal services, Bel and Fageda (2009) identify four main types: fiscal stress, economic efficiency, political processes and ideological attitudes. However, these authors also indicate firstly that the overall statistical significance of the relationships found is low and that, in the second place, it is difficult to find systematic patterns of local government behaviour where privatization decisions are concerned.

One possible explanation for the low significance of the models is that a large number of papers are based on *cross-section data*, that is, data that refer to a particular moment and which therefore lack the time factor. This is a significant limitation, as the values of the explanatory variables at the time the data are observed are included in the analysis, rather than the actual time when local governments make a particular decision (Boyne 1998; Bel and Fageda 2007). There are already studies that have taken into account how important it is to include information on the explanatory variables at the time the local government makes its decision (Hefeltz and Warner 2004; Lamothe *et al.* 2008).

Furthermore, it is probably difficult to find common local government decision making patterns because results are compared to those in studies carried out on different services. For example, it does not seem logical to expect the factors that influence decision making regarding the running of municipal sports activities to be the same as those that explain the privatization of the water supply system or the urban rubbish collection. In other words, the type of service conditions local government decision making (Ferris and Graddy 1988; Nelson 1997; Joassart-Marcelli and Musso 2005).

Concerning the variables capable of explaining local government decisions to privatize local services, the review of the literature undertaken in this section allows us to add some general observations of interest. In the first place, the decisions to delegate the management of municipal services to private firms appear to be justified by the strategy aimed at making the most of economies of scale. Some of the papers reviewed provide evidence that the likelihood of municipal services being privatized augments with the size of the population (Miranda 1994; Greene 1996; Bel and Miralles 2003). In this sense, the most populated cities tend to have the advantage of specialization and experience; moreover, transaction costs in these cities are lower (Nelson 1997).

In contrast, the strategy employed by smaller municipalities is to transfer responsibilities to consortiums of municipalities in order to share the fixed costs of the service. The decision on behalf of various municipalities to jointly provide a given service will tend to create a more favourable framework to make the most of economies of scale (Warner and Hebdon 2001; Warner and Hefetz 2003; Bel *et al.* 2007). In fact, the attempt to take advantage of economies of scale by means of a monopoly service delivery within a whole jurisdiction has been a keystone in Europe (Warner and Bel 2008).

In the second place, a large number of papers state that the financial difficulties that city councils may face at a given moment in time increase the likelihood of the management of municipal services being delegated. This aspect was specifically addressed in the 1980s in the United States, where the relationship between the change in State legislation to restrict the rise in local taxes, on the one hand, and the decision to externalize municipal services, on the other, was analyzed. The financial burden of local governments can encourage them to privatize municipal services (López de Silanes *et al.* 1997; Kodrzycki 1998; Walls *et al.* 2005). Establishing limits on local government income and borrowing, along with new responsibilities to be dealt with, can drive local governments to privatization.

In the third place, political interests and ideological motives can also influence local government decision making. The decision to privatize could, a priori, be linked to interest in obtaining income that could stem from the management of the service changing hands. According to Hart *et al.* (1997), private production can provide politicians with material gains, as the income received from private firms (through bribes or election campaign funding) is more difficult to control than taking income from the government budget or from public companies. The presence of powerful business groups and a well-structured and influential business network could be related to a greater tendency to privatize public services (Morgan *et al.* 1988; Warner and Hefetz, 2002). Likewise, a greater weighting of public employment or more pronounced associationism on behalf of civil servants could be linked to local governments being less inclined to privatize (Miranda 1994; Dijkgraaf *et al.* 2003).

In addition to the above, different ideologies on behalf of the political parties in power could be associated to different stances with regard to privatizing municipal services. Generally speaking, conservative governments would normally favour privatization, while left-wing governments would defend more public control when it comes to providing general interest services. However, where local governments are concerned, this relationship receives little support from empirical research (Bel and Fageda 2007).

Fourth, and finally, we have to mention the neighbouring effect (Bel and Miralles 2003). Local governments could be more inclined to privatize a service when other towns in the immediate vicinity have already decided to transfer management to a private firm (Reimer 1999). There could be two main causes for this. On the one hand, a private firm that is already established in a town in order to provide a given local service can follow the managerial strategy of expanding its activity to supply neighbouring towns (Donahue 1989). On the other hand, experience in privatization in nearby towns can reduce uncertainty and possible citizen reluctance to the decision of privatizing the management of municipal services.

2.2. Why do Towns Privatize Water Services?

Considering the large number of studies that have compared the performance of publicly and privately run urban water services, there is very little research on the factors that explain the reasons behind privatizing. As noted in the introduction, Ménard and Saussier (2000) is the only study that specifically analyzes the factors underlying the decision of local governments regarding the provision of municipal water services. Some papers make references to this issue, albeit not addressing it specifically (Carpentier *et al.* 2006 and Martínez-Espiñeira *et al.* (2009), while others carry out multi-sector studies of local government privatization decisions that include water services (Joassart-Marcelli and Musso 2005; Tavares and Camöes 2007; Bel and Fageda 2008).

Ménard and Saussier (2000) analyze the determinants of which management option is chosen in the case of municipal water services in France, with information from 2,109 companies that provide water services for towns of more than 5,000 inhabitants. More specifically, ordered logit and multinomial logit techniques are used to analyze the likelihood of a service being directly run by the town council, being partially privatized by means of leasing, or being fully privatized by means of a concession. The results obtained show that local governments are less likely to privatize water services in towns which require a larger investment per capita for the service to be provided, which are also usually the smallest in terms of population and which have underground water resources. Likewise, it is also observed that the larger the population of a town and the problems it has to obtain financial resources, the greater the probability of privatizing.

Also for France, Carpentier *et al.* (2006) analyze how delegating water services to private firms affects water prices. A probit regression analysis is carried out in a first stage of this study to determine the factors that influence the probability of the service being privately run. The main result is that local governments normally allow private firms to manage the service when the area involved is more complex, which would partly explain why private firms charge higher water prices than publicly run firms. In addition, some of the factors that increase the probability of service being privatized are lower water quality at origin, a network that is more difficult to manage, due to low network density per user of the service, and being a tourist town located on the coast.

Furthermore, Martínez-Espiñeira *et al.* (2009) explore whether private firms charge higher prices for water than publicly-run firms in Spanish cities. Other possible effects aside, private management is indeed found to charge higher prices for providing municipal water services. A probit regression is carried out in the first part of the study finding that on the one hand, local governments tend to delegate the management of water services to private firms when the operating environment is more complex, while on the other hand, private firms tend to establish themselves in towns that offer greater profitability.

In some papers that study the decision to delegate various municipal services, references are made to water services, as mentioned above. Joassart-Marcelli and Musso (2005) analyze the choice of management made for eight types of municipal services. The research distinguishes between the different ways of providing services and the decision itself is treated as a dynamic choice. In comparison to other municipal services where there is a greater tendency to privatize, such as garbage disposal, these authors add that where the supply and purification of water is concerned, the governments that outsource the management of the service generally opt for other public agencies such as special districts.

Likewise, Tavares and Camöes, (2007) study why some municipal services are managed directly, whereas in other cases, their management is delegated. Using data from 278 local governments in Portugal, the authors use multivariate probit models to analyze the factors explaining the choice of public or private management of services for seven municipal areas. Out of all the explanatory variables considered, only financial dependency, which measures the proportion of central government grants over total municipal revenues, was statistically significant when explaining local government decisions of whether or not to privatize municipal water supply and solid waste management services.

More recently, Bel and Fageda (2008) jointly analyze the reason behind the privatization of local water and solid waste services. The research is based on information from 539 Spanish municipalities in the case of solid waste collection services, and 546 municipalities in the case of water distribution, with data referring to 2003. The main contribution of this paper is the inclusion of a variable providing information about transaction costs in local service delivery choices. The paper concludes that it is less likely the water service will be privatized, as this industry entails higher transaction costs.

3. DATA, METHODOLOGICAL NOTES AND RESULTS

The aim of our research is to test some of the hypotheses outlined in the previous section regarding the causes explaining why local governments privatize water services. Among other factors, we test whether variables that represent the existence of economies of scale, financial limitations, political and ideological aspects or a possible proximity effect explain the privatization of water services. In addition, we have included variables representative of the complexity of the environment due to the peculiar characteristics of the sector under analysis. Appendix 1 includes a list of the variables used, together with a description of each, how they are included in the model and the statistical source where data came from in each case.

The data used in this research are made up of information on 741 municipalities in Andalusia, a region located in Southern Spain with a population of nearly 8.2 million.

Data refer to the period dating from 1985 to 2006 and the sample represents somewhat more than 96% of municipalities in Andalusia and more than 97% of the population. Some descriptive statistics are included in *Table 1.* These data have been recently used in a duration analysis to analyze the *risk* of municipal water services being externally contracted (González-Gómez and Guardiola 2009).

As regards the methodology, as most of previous research in this field (Bel and Fageda, 2007; 2009) we use a binomial discrete choice model. Using the end of the sample period as a reference, the dependent variable, or variable to be explained, takes a value of 1 if the water service has been privatized during the period and 0 if this is not the case. Similarly, as mentioned in the introduction, one of the main contributions this research makes is that the moment a local government decides to privatize the service has been taken into account when measuring the explanatory variables. The sign of the estimated parameters of each significant variable is interpreted as its effect, positive or negative, into the probability of privatization. In addition, the magnitude of such a relationship is quantified by the marginal effect, which reports the change in the probability of privatization due to an infinitesimal change in each independent continuous variable, and the discrete change in the probability for dummy variables.

Our approach hence allows us to perform an ex-post statistical analysis of the factors that have affected the decisions of privatising local water services in Andalusia over the period analysed. Furthermore, predictions about the probability of future privatisations can also be made. However, the latter means assuming that the future will behave like the past. Another drawback of this regression-based approach is that not all the variables affecting the decision of privatising are accounted for. Lack of information about some relevant variables and also the influence of other factors that are difficult to quantify on the decision to privatise would result in the model losing prediction power. Some more technical information about probit methods can be found in any advanced econometric text, such as Greene (2008).

Water services were privatized by slightly more than 26% of municipalities in Andalusia between 1985 and 2006. Many municipalities in Spain have privatized this service since, in the second half of the 1980s, Law 7/1985 made it possible for local governments to privatize municipal services. Considering the provinces in Andalusia, the greatest tendency to privatization is found in Cádiz, while the lowest tendency is found in Huelva (see *Figure 1*). Our estimates determine some of the factors that explain the decision to privatize water services in Andalusia. The estimated parameters of the probit model with their statistical significance and the marginal effects are included in *Table 2*.

Results show that the variable *population* has a positive and statistically significant relationship with the decision to privatize. Therefore, the larger the municipality, the greater the probability of the local government contracting a private firm to run the service, the marginal effect being 0.0054. In other words, one thousand additional people increase the probability of privatization by 0.54 per cent. However, the negative and statistically significant sign of the variable *square of population* indicates that despite there being a greater tendency to privatize the larger the municipality, this effect is decreasing. What is more, when population exceeds a certain threshold, the probability of water services being privatized decreases.

These results fall in line with those obtained by research devoted to studying the efficiency of the water industry. The literature on this subject holds that, although the sector enjoys significant economies of scale, they are not inexhaustible and tend to diminish if the size of an operation exceeds a certain level (Kim and Clark 1988; Antonioli and Filippini 2001). In such cases, this could be explained by a trade-off between the various activities of the firm. Clark and Stevie (1981) state that the positive effects of the water treatment operation growing larger could be offset by higher transport costs in the supply stage when an increase in the scale of operations leads to the population being more widely dispersed. Similar evidence is obtained by Chandler and Feuille (1994) in the case of heath services and Bel and Miralles (2003) for urban solid waste collection services.

According to Bakker (2002), the lack of financial resources to invest in infrastructure was one of the key factors behind the private sector moving into the water industry in Spain. The sign of the parameter associated to the variable *financial burden* and its statistical significance support this relationship, indicating that the local governments that suffered the most financial difficulties during the sample period opted to a greater extent for privatizing their water services. This alternative is a way of guaranteeing the provision of general interest services and, at the same time, of balancing public finances.

Ménard and Saussier (2000) and Carpentier *et al.* (2006) note that the complexity of the environment that a water service manager must face plays a key role in the decision made by the local government. In this sense, more complex environments increase the probability of the service being privatized. In order to ascertain how complex the task of supplying water services was, three variables were included in the model: *density of population, water capture and Sur River Basin* (let us recall that precise definitions of these variables can be consulted in *Appendix 1*). On the one hand, high population density and a water capture system based on the force of gravity would indicate a less complex environment for providing water services. The third variable, on the other hand, aims to capture the difficulties that the *Sur River Basin* entails, due to the fact that it is the most used water resource of all the basins in Andalusia.

The parameter of the variable representing the geographical density of population displays the expected sign, but is not statistically significant. Conversely, the water capture system is important in the decision of privatization. According to the marginal effect of this variable, if the water is captured using mechanical means, then the probability of privatization increases by 6.08 per cent. Hence, in the municipalities where mechanical means are required to extract water resources, the probability of services being privatized is greater. Finally, the geographical variable *Sur River Basin* is not significant when it comes to explaining the greater or lesser probability of privatizing water services.

In order to capture the effect of proximity, we included the variable *neighbouring effect*, which represents the percentage of municipalities that have already privatized their water services in each of the eight provinces that make up the region of Andalusia. Provinces are the most appropriate territorial unit to capture the effect of proximity, as provincial governments act as a forum for local mayors to share experiences and propose solutions to common problems.

Our research obtains empirical evidence of the relationship between the neighbouring effect and the privatization of water services. As noted previously, there are two possible reasons behind this relationship. On the one hand, firms that are already established in an area, but which plan to expand in order to increase their demand and take full advantage of economies of scale, offering attractive deals to municipalities in the vicinity of their area of service. In addition to this, and on the other hand, the experience of other neighbouring municipalities in privatization can reduce the uncertainty in decision making processes, as local governments can compare their management of the service to the private firms operating in municipalities in their area.

As regards the variables that represent ideological and political behaviour, the results obtained were those expected. As in most of the research carried out previously, the variable *ideology of the municipal government* is not statistically significant. This finding confirms that local government decisions regarding the public or private management of municipal water services are mainly due to pragmatic rather than ideological reasons.

The sign obtained for the variable income per capita reveals that municipalities with a higher level of income are more inclined to privatize municipal water services. Hence, we could interpret that private firms are more likely to enter this industry in wealthier areas, where the services is expected to be more profitable. Likewise, the negative sign recorded by the variable public employment and the fact that it is statistically significant, reveals that municipalities with a greater proportion of public sector employment are more reluctant to privatize water services. One logical explanation for this finding is that civil servants believe their working conditions will worsen if the service is privatized and, as a result, are opposed to it.

Finally, a variable was incorporated to capture the effect of municipalities being part of a consortium with supramunicipal jurisdiction over the provision of water services on the probability of the service being privatized. However, this variable was found not to be statistically significant in the estimations carried out.

Meanwhile, Bel and Fageda (2009) recently pointed out that the influence of certain explanatory variables on the probability of local governments privatizing water services might well be different depending on the size of the municipality. In order to test this hypothesis, we have repeated the estimations for two different groups of municipalities, namely, municipalities with up to and including 3,000 inhabitants and municipalities with more than 3,000 inhabitants. This cut-off point was chosen in order to obtain two balanced sub samples. Results are presented in *Table 3.*

The results obtained show that for some variables the significance of the relationships found in the sample as a whole is different depending on the size of the municipality, which makes it possible to add some interesting observations to our research. In the first place, the impact of size on the probability of privatization is considerably more significant in the group of municipalities with 3,000 or less inhabitants than in larger municipalities. Likewise, we found that the variable community was this time significant in the group of municipalities with a population of 3,000 or less, but not in the case of larger municipalities. If we consider these results globally, the signs of the variables population and community suggest that smaller municipalities are more interested in seeking efficiency by delegating the management of their water services to a private firm if they are part of a larger community of municipalities. Associationism allows particularly smaller municipalities to make the most of economies of scale.

The differences observed between the two groups of municipalities in terms of the significance of the variables financial burden and income per capita could, likewise, suggest a greater inclination on behalf of private firms towards establishing operations in municipalities where their activity is expected to yield larger profits. If income per capita is the same, potential profits stemming from managing the service are greater in more populated areas. Furthermore, when the level of fiscal stress is similar, there will more than likely be more guarantees and solvency in larger municipalities to tackle the contingencies of a financial nature that a firm must face when taking over the management of water services.

SUMMARY AND CONCLUDING REMARKS

The wave of privatization of public services in developed countries over the last few decades has been justified by the need to achieve greater levels of efficiency and productivity. The empirical research carried out on the water industry has paid special attention to analyzing the differences in efficiency between publicly and privately run firms. However, the main finding is that there is no conclusive empirical evidence to support the theory that a privately run service is more efficient. Therefore, if privatizing water services does not necessarily mean improving levels of efficiency, what factors play a part in the decision to privatize?

The literature proposes various hypotheses to explain the decision to privatize municipal services. However, very few papers have tested these hypotheses empirically in the case of municipal water services. In this scenario, this paper analyzes the factors determining the decision to privatize municipal water services in Andalusia, a Southern Spanish region, over the period dating from 1985 to 2006. As regards the method used, the analysis was carried out employing probit regression techniques. Similarly, we have taken into account the temporary dimension of the explanatory variables, seeking to match them to the moment when the decision to privatize is taken. Finally, the model was applied to the sample group of municipalities as a whole, as well as to two sub-groups, according to municipality size.

The results of the analysis lead us to conclude, in the first place, that local governments' decisions to privatize water services are based more on pragmatic than ideological grounds. In the second place, empirical evidence is obtained that local governments privatize the management of water services to make the most of the economies of scale present in the sector and also in the case of potential financial difficulties. Likewise, local governments tend to privatize less when there is a high probability that doing so could trigger a conflict with workers in the public sector.

Similarly, the results obtained by this research make it possible to state that private firms are more inclined to become established in municipalities where the profitability they expect from their activity is greater. Furthermore, empirical evidence is also obtained that the past experience of other municipalities in the same area influences the decision to privatize. As a result, the reduction in uncertainty and the expansion plans of firms already established in nearby municipalities are also explanatory factors of the privatization of water services.

Finally, differences in the factors that influence the decision to private water services were found when the sample was divided into two groups according to population.

In smaller municipalities, there is a clearer strategy aimed at reducing costs by making the most of the economies of scale in the industry. As regards larger municipalities, private firms are more interested in this industry in cities or towns where the profits this business is expected to yield are greater.

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Appendix 1. Variables: Description and Sources.

Variable	*Description*	*Source*
Privatization	Dummy variable that takes a value of 1 if at the end of the period 1985-2006 the council has privatized water services and 0 if not.	City and Town Councils and private firms.
Population	Population in 1,000s of inhabitants. If the municipality privatizes, it takes the value from the year prior to privatization. In case of not privatizing, it takes the average value over the period.	Municipal Census. National Institute of Statistics (INE).
Density of population	Inhabitants per km^2 in 1,000s. In the case of privatization, this variable takes the value from the year prior to privatization. In the case of not privatizing, it takes the average value over the period.	Municipal Census and Statistical Yearbook of Spain. National Institute of Statistics (INE) and National Geographic Institute.
Ideology	Dummy variable equal to 1 if the council privatized during the period considered and its ideology was right-wing at the time of this decision or if it did not privatize and the party in power the most time during the period was right-wing. It equals 0 if the council privatized and its ideology was left-wing at the time of this decision or if it did not privatize and the party that was most time in power was left-wing.	Census. Ministry of Public Administrations.
Financial burden	Sum of financial expenditures over sum of ordinary revenues of the local government. In the case of privatization, this variable is the value of the financial burden in the year before the decision was taken. In the case of not privatizing, it is the mean over the entire period.	Local Corporation Budget. Ministry of Economic Affairs.
Consortium	In the case of privatization, this dummy variable takes a value of 1 if the council was integrated in a consortium the previous year and 0 otherwise. In the case of not privatizing, it takes a value of 1 if the municipality belongs to a consortium in the middle of the period and 0 if not.	Ministry of Public Administrations.
Water capture	Dummy variable equalling 1 if water is captured using mechanical means, and 0 if it is captured using the force of gravity.	Local infrastructures and Equipment Survey. Ministry of Public Administrations (SINAC). Ministry of Health and Consumption.
Income per capita	Euros per inhabitant. If the municipality privatizes, it takes the value from the year before privatizing. In the case of not privatizing, it takes the average value over the period.	Department of Economic Affairs and Public Finances. Andalusia Regional Government.
Public employment	Percentage of public employment. If the municipality privatizes, it takes the value from the year before the decision. If not, it takes the average value over the period.	Department of Economic Affairs and Public Finances. Andalusia Regional Government.
Neighbouring effect	Percentage of municipalities that have privatized within the province the municipality belongs to. In the case of privatization, it takes the value from the year before the decision was made. In the case of no privatization, it takes the average value over the period.	City and town councils and private firms
River Basin of Sur	Dummy variable taking a value of 1 if the municipality belongs to the Sur River Basin and 0 otherwise.	Annual Report of the Southern Hydrographic Federation

Table 1. Descriptive Statistics. Average for the entire period 1985-2006.

Variable	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Privatization (dummy; 1=privatized, 0=not privatized)	0.261	0.440	0	1
Population (1000s inhabitants)	10.092	39.314	0.047	704.154
Density of population (1000s inhabitants per km^2)	0.203	0.900	0.002	16.675
Ideology (dummy; 1=right, 0=left)	0.117	-	0	1
Financial burden	4.842	3.986	0.002	35.245
Consortium (dummy; 1=consortium, 0=not)	0.302	-	0	1
Water capture (dummy; 1=water is captured mechanically, 0=not)	0.721	-	0	1
Income per capita (€ per inhabitant)	2,379.7	903.2	369.9	8,402.3
Public employment (%)	9.17	5.37	0.82	42.62
Neighbouring effect (%)	14.54	10.96	0	54.54
Sur River Basin (dummy; 1= belongs to the Sur River Basin, 0=not)	0.321	-	0	1

Table 2. Determinants of the Decision to Privatize Municipal Water Services. 1985-2006. All Municipalities.

Variable	*Parameter*	*Standard error* [a]	*Marginal effect* [b]
Population	0.0196**	0.0086	0.0054
Square of population	-9.56e-08*	5.14e-08	-2.64e-08
Density of population	-0.0494	0.0742	-
Ideology	-0.1280	0.1775	-
Financial burden	0.0281*	0.0156	0.0077
Consortium	0.0749	0.1223	-
Water capture	0.2307*	0.1300	0.0608
Income per capita	2.63e-07***	9.27e-08	7.26e-08
Public employment	-0.0485***	0.0147	-0.0133
Neighbouring effect	0.0354***	0.0059	0.0098
River Basin of Sur	-0.0170	0.1275	-
Constant	-1.8899***	0.3014	-
Wald test of joint significance (χ^2) [c]	100.14 (0.0000)		
Pseudo R^2	0.1868		
Number of observations	741		

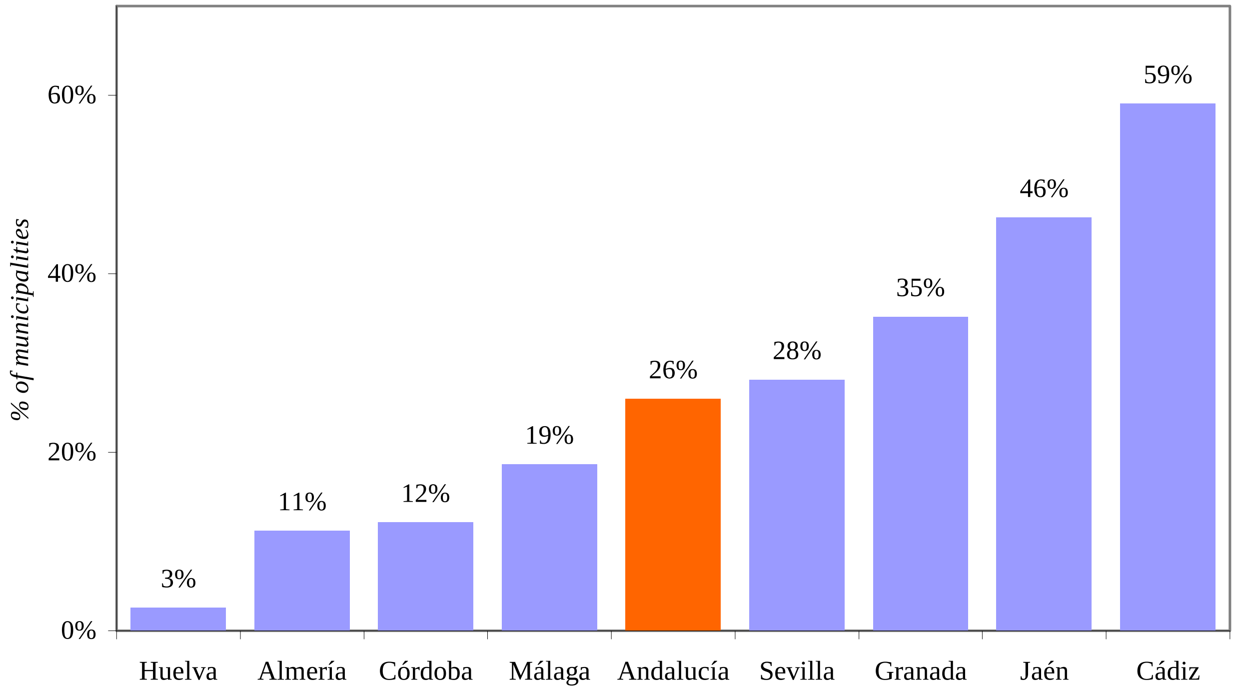
[a] *Standard errors are computed using robust White's estimation.*
[b] *Marginal effects are reported only for significant variables.*
[c] *Probability of non-significance of the model in brackets.*
** Significant at 10%; ** significant at 5%; *** significant at 1%.*

Table 3. Determinants of the Decision of Privatizing Municipal Water Services. 1985-2006. Municipalities Grouped according to Size.

Variable	Municipalities with 3,000 or less inhabitants			Municipalities with more than 3,000 inhabitants		
	Parameter	*Standard error* [a]	*Marginal effect* [b]	*Parameter*	*Standard error* [a]	*Marginal effect* [b]
Population	1.4937**	0.5896	0.1744	0.0108	0.0077	-
Square of population	-0.0004**	0.0002	-4.62e-05	-5.92e-08	4.02e-08	-
Density of population	-0.8740	1.0144	-	-0.0035	0.0701	-
Ideology	0.0803	0.2291	-	-0.2042	0.2868	-
Financial burden	0.0007	0.0400	-	0.0392**	0.0176	0.0148
Consortium	0.7792***	0.2119	0.0125	-0.3394**	0.1501	-0.0125
Water capture	0.4415	0.2106	-	0.2071	0.1811	-
Income per capita	9.22e-09	1.98e-07	-	2.16e-07*	1.11e-07	8.15e-08
Public employment	-0.0371	0.0233	-	-0.0376	0.0252	-
Neighbouring effect	0.0743***	0.0159	-0.0043	0.0211***	0.0065	0.0079
River Basin of Sur	0.2566**	0.2165	0.0558	-0.1056	0.1748	-
Constant	-3.6623***	0.7354	-	-1.2583***	0,3894	-
Wald test of joint significance (χ^2) [c]	48.53 (0.0000)			28.07 (0.0000)		
Pseudo R^2	0.3183			0.0909		
Number of observations	385			356		

[a] *Standard errors are computed using robust White's estimation.*
[b] *Marginal effects are reported only for significant variables.*
[c] *Probability of non-significance of the model in brackets.*
** Significant at 10%; ** significant at 5%; *** significant at 1%*

Figure 1. Percentage of Privatized Municipalities per Province in Year 2006.



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